

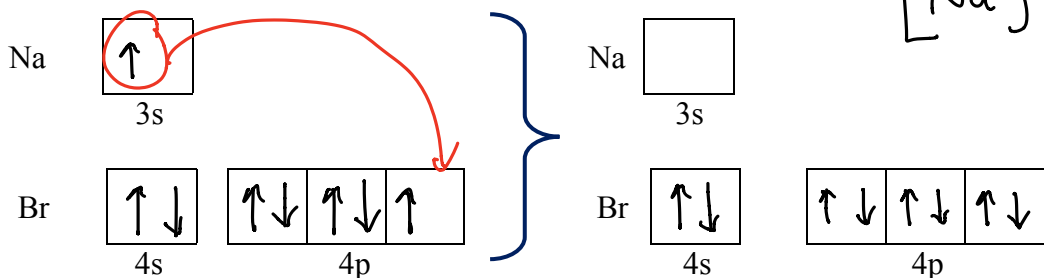
SCH4U – Lesson 10

Ionic Bonding and Ionic Compounds

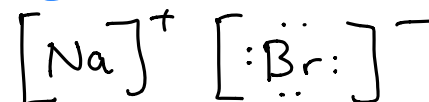
Ionic Bonding

- Ionic bonds: Electronegative difference greater than 1.7.
- Transfer of an electron between a metal and a non-metal
- The transfer of electron(s) between two different ionic compounds can be represented in the following way:

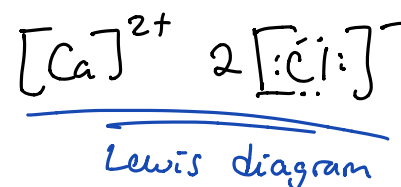
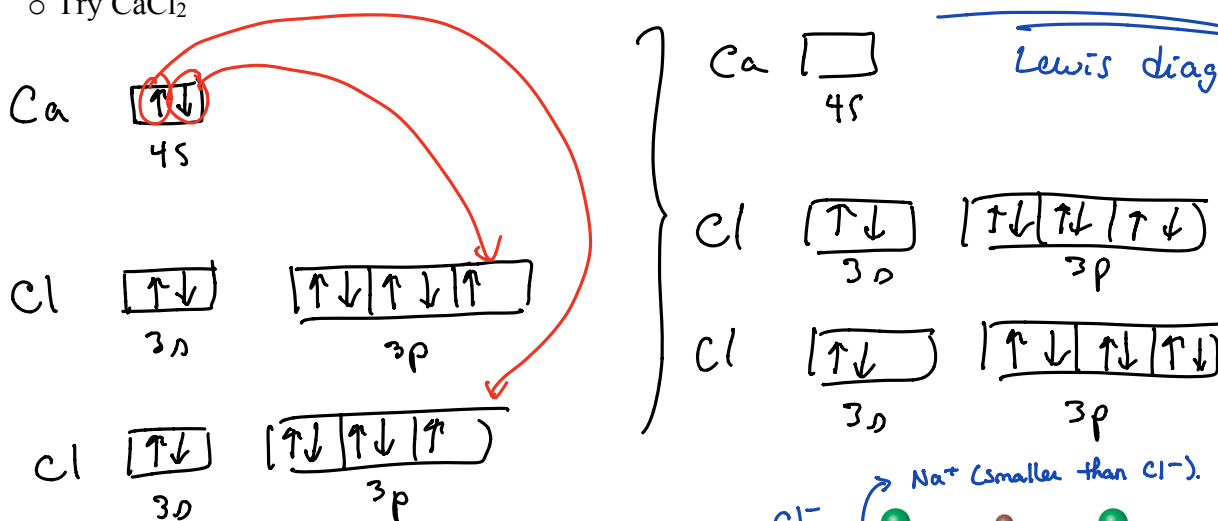
- Using NaBr as an example



Lewis diagram



- Try CaCl₂



- Ions pack together tightly in a 3D pattern of alternating positive and negative ions called a crystal lattice

*lattice energy.

- The attractive force between an atom and its adjacent atoms of opposite charge is equal.

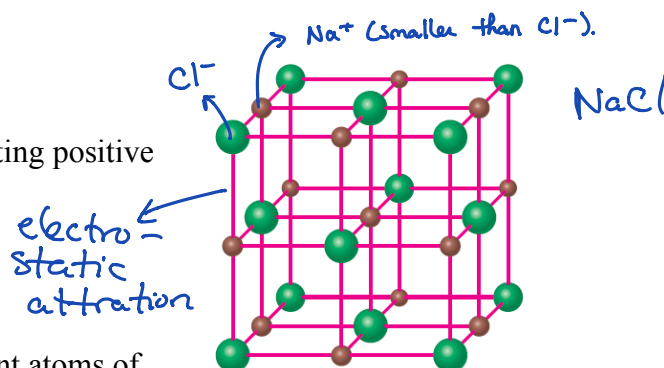


Image credit: McGraw-Hill
Ryerson Chemistry 12 (p. 215)

- Ionic crystals:
 - Can take on different shapes depending on the ways the ions are packed together.
 - Crystals are packed in such a way that oppositely charged ions are as close as possible.
 - The relative size ions as well as their charge also have an influence the shape of the crystal.

Properties of ionic compounds

- Melting and boiling points:
 - The larger the charges, the stronger the attractive force between the ions, and thus increases the melting and boiling points.
 - Ex: $\text{MgO}_{(s)}$ vs. $\text{NaCl}_{(s)}$ $\rightarrow \Delta EN = 2.3$
 $\Delta EN = 2.1 \rightarrow$ expected to have \uparrow melting and boiling points.
 - Smaller ions allow for a more compact packing, increasing the attractive force between the ions
 - Ex: $\text{NaI}_{(s)}$ vs $\text{NaCl}_{(s)}$ \rightarrow Cl has a smaller atomic radius compared to I.

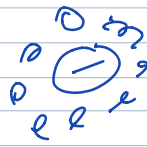
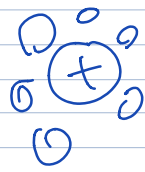
- Solubility:
 - An ionic compound is soluble in water if the attractive force between the ions is weaker than the attractive force between the water molecules and the ions.
 - Why are some ionic compounds not soluble in water?
 - Many factors involved.

NaCl



- Mechanical properties:
 - Ionic compounds: Hard and break or shatter easily (brittle)
 - Subject them to enough stress and they tend to break or shatter.

- Conductivity:
 - Ionic compounds in their solid form do not conduct electricity.
 - Ionic compounds can conduct electricity when dissolved in water or melted
 - ions are free to migrate to the oppositely charged electrodes.



free ions moving
in water

